CLAIMS

WHAT IS CLAIMED IS:

1. A method for manufacturing an optical waveguide refractive index grating having a desired grating pitch Λ, the method comprising the steps of:

   providing a photosensitive waveguide;

   providing a writing beam of actinic radiation, the writing beam having an intensity;

   translating the waveguide relative to the writing beam at a velocity v(t);

   modulating the intensity of the writing beam as a function of time at a frequency f(t), wherein $\frac{v(t)}{f(t)} \approx \Lambda$;

   the step of modulating the intensity of the writing beam as a function of time at a frequency *f(t)* comprising the step of varying Λ.

2. The method of claim 1, including the steps of translating a chirped phase mask through the writing beam to create an interferogram of a changing period $\Lambda(t)$, where

$$\Lambda(t) = \Lambda_s + \frac{d\Lambda}{dt} \cdot t ,$$

   where Λ_S is a starting period;

   the step of modulating the intensity of the writing beam by varying of Λ wherein,

$$f(t) = \frac{v}{\Lambda_s + \frac{d\Lambda}{dt} \cdot t}$$

   to maintain a resonance condition

3. The method of claim 1, the step of providing a writing beam comprising providing a writing beam having a peak intensity illuminating the fiber I_0 and a width D,

wherein the fluence $\Phi(x)$ delivered to the waveguide is determined by the equation

$$\Phi(x) \approx \frac{I_0(x)}{4} \cdot \frac{D}{v(x)} \cdot \left\{ A(x) - \frac{m(x)}{2} \cdot \cos\left[\frac{\omega(x)}{v(x)} \cdot x \right] \right\},$$

wherein A is an offset and m is fringe visibility.

4. The method of claim 1, wherein the varying-period interferogram is produced using a tunable interferometer.

5. A long-length phase continuous Bragg grating manufactured in accordance with the method of claim 1.

6. The grating of claim 5, the grating having a length of at least 2.5 meters.

7. The grating of claim 5, wherein the grating has a length of at least four meters.

8. The grating of claim 5, wherein the grating is a continuous phase Bragg grating.

9. The grating of claim 5, wherein the waveguide is a photosensitive optical fiber and the grating is a continuous refractive index perturbation.

10. The grating of claim 5, wherein the index perturbation has a changing periodicity along the length of the grating.

11. The grating of claim 5, wherein the step of translating included placing the waveguide on a rotary stage.

12. The grating of claim 5, where in the grating is chirped.

13. An optical dispersion compensator comprising the grating of claim 5.

14. A broadband light generator comprising the grating of claim 5.

15. A rapid spectral interrogator comprising the grating of claim 5.

16. A sensor comprising the grating of claim 5.

17. A method for writing a refractive index grating having a desired grating pitch Λ on an optical waveguide, the method comprising the steps of:

providing a writing beam of actinic radiation;

translating the waveguide relative to the writing beam at a velocity v(t);

modulating the intensity of the writing beam as a function of time at a frequency f(t), wherein $\frac{v(t)}{f(t)} \approx \Lambda$;

the step of modulating the intensity of the writing beam as a function of time at a frequency *f(t)* comprising the step of varying Λ.

18. A grating manufactured in accordance with the method of claim 17.